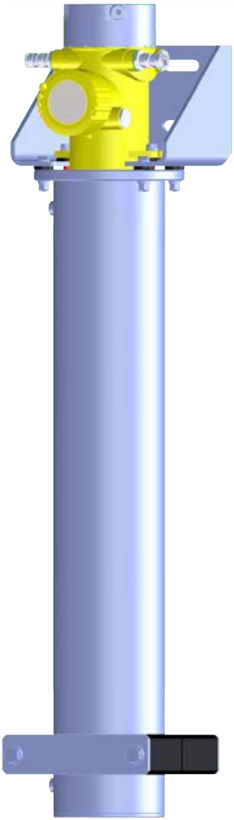
Supplementary instructions

Water cooling - SOLITRAC 31, POINTRAC 31

Active water cooling system for radiation-based sensors



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Contents

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1 Product description

1.1 Configuration

The active water cooling system is suitable for radiation-based sensors of series SOLITRAC 31 and POINTRAC 31.

The water cooling system consists of several modules.

Housing cooling lid (A)

The housing cooling lid can be screwed onto the instrument housing instead of the normal housing lid.

Scintillator cooling (B)

The cooling module for the scintillator cools the active measuring part of the sensor.

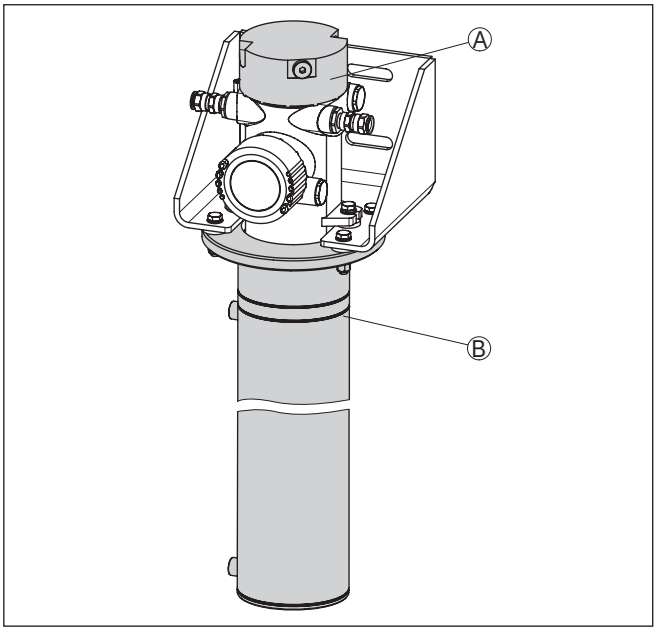

Fig. 1: Active water cooling system with fastening bracket

A Housing cooling lid
B Scintillator cooling

Scope of delivery

The following parts belong to the scope of delivery of the water cooling system:

- Scintillator cooling (1 piece)
- Mounting clamp (quantity depending on sensor length)
- Fastening bracket
- Housing cooling lid
- Sealing ring 78 x 3 (2 pcs.)
- Isolating sleeve (6 pieces)
- Fixing screw M8 x 50 (2 pieces)
- Fixing screw M8 x 40 (4 pieces)

- Washer for M8 (12 pieces)
- Hexagon nut M8 (6 pieces)
- Coolant hose ¼", length: 550 mm (21.65 in)
- NPT threaded adapter for cooling hoses ¼" (optional)

Information:
When the sensor is ordered with cooling, the sensor and the water cooling system are shipped already premounted.

If the cooling is ordered later, you have to mount the water cooling system on the sensor.

You can find further information in chapter "*Mounting*".

2 Mounting

Mounting preparations

Operating instructions

Take note of the operating instructions manuals of the corresponding radiation-based sensors and the source holder.

Warning:
During all mounting and dismounting work, the source container must be in switch position "OFF" and secured by a lock.

Carry out all work within the shortest possible time and at the largest possible distance. Provide suitable shielding.

Avoid risk to other persons by taking suitable measures (e.g. safety fence, etc.).

Mounting may only be carried out by authorized, qualified personnel who are monitored for radiation exposure according to local laws or the handling permit. Take note of the specifications in the handling permit. Also take the local conditions into account.

Caution:
The cooling system is used in areas with high temperatures. Therefore, use temperature-resistant cable and install it in such a way that contact with hot components is avoided.

General mounting instructions

Information:
When the sensor is ordered with cooling, the sensor and the water cooling system are shipped already premounted.

If the cooling is ordered later, you have to mount the water cooling system on the sensor.

Required tools:

- Fork wrench SW13 mm (2 pieces) - for the housing cooling
- Fork wrench SW19 mm (2 pieces) - for the mounting clips and the hose fittings of the cooling circuit
- Acid-free grease - for greasing the sealing rings

Take note of the following general mounting instructions:

- First of all, mount the fastening bracket and the scintillator cooling, and then the sensor
- The small lid of the instrument housing must point to the front after mounting the fastening bracket (x)
- The sensor together with the water cooling system is very heavy. Use a suitable lifting device for mounting, e.g. a sling

Insert the sealing rings

1. Slightly grease the two sealing rings (14) with acid-free grease.
2. Insert the two sealing rings (14) from the inside into the grooves of the scintillator cooling (B).

   The following illustration shows the inside grooves.

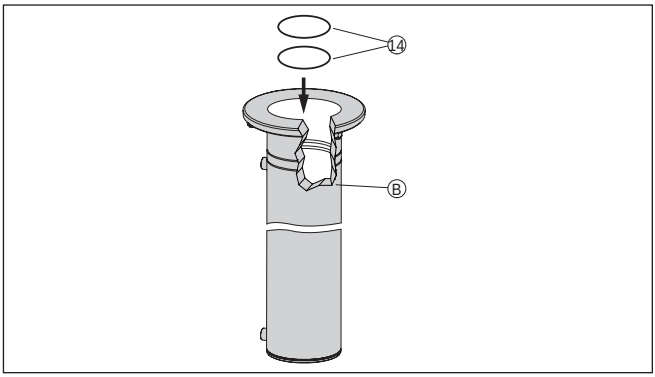

Fig. 2: Insert the sealing rings inside into the scintillator cooling

14 Sealing ring (2 pieces)
B Scintillator cooling

Mount the fastening bracket

1. Place the isolating sleeves (4) between the scintillator cooling (5) and the fastening bracket (1).

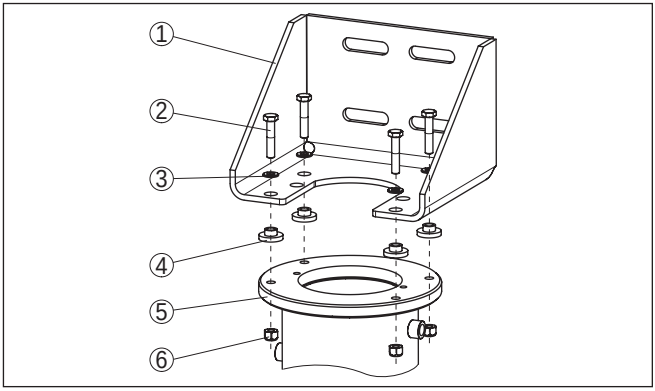

Fig. 3: Scintillator cooling

1 Fastening bracket
2 Hexagon screws M8 x 40 (4 pieces)
3 Washer for M8 (8 pieces)
4 Isolating sleeve (4 pieces)
5 Scintillator cooling
6 Hexagon nut M8 (4 pieces)

2. Place the fastening bracket (1) onto the scintillator cooling (5). Make sure that the coolant connections point in a suitable direction. Rotating the holding bracket later (1) is very difficult.
3. Connect the fastening bracket (1) with the scintillator cooling (5) according to the illustration and tighten the screws (2, 3, 6) with a torque of 15 Nm (11.06 lbf ft).

Scintillator cooling

Take note of the following general mounting instructions:

- The sensor together with the water cooling system is very heavy. Use a suitable lifting device for mounting

Mounting the scintillator cooling

1. The sensor marking is no longer visible when the scintillator cooling is mounted. You can find the position of the sensor marking according to the following illustration.

   Add the sensor marking with a waterproof marker or a permanent, coloured adhesive tape to the outside of the scintillator cooling.

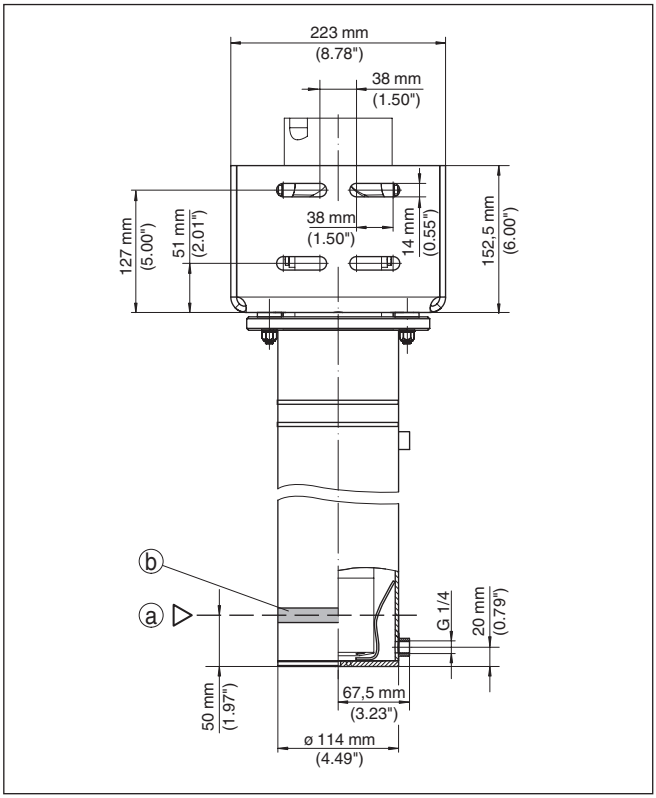

Fig. 4: Position of the sensor marking and drilling template of the fastening bracket - SOLITRAC 31, POINTRAC 31

a Position of the lower measuring range end
b Sensor marking on the upper edge of the lateral connection nozzle

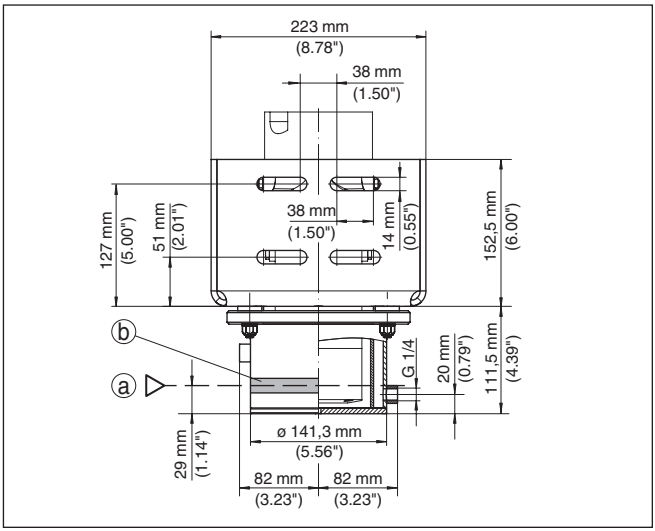

Fig. 5: Position of the sensor marking and drilling template of the fastening bracket - POINTRAC 31 - short version (46 mm)

a Position of the lower measuring range end
b Sensor marking on the upper edge of the lateral connection nozzle

2. Insert the sensor into the scintillator cooling.

   The small lid of the instrument housing must point to the front after mounting on the fastening bracket (x).

   It is advisable to place the sensor and the scintillator cooling on the floor while inserting. This applies mainly to longer sensor versions. Protect the sensor by covering the sensor housing during mounting.

   In case of long instrument versions, it can be possible that the sensor does not immediately slide completely into the scintillator cooling due to its own weight. Turn the sensor and the scintillator cooling by 90° and try to slide in the sensor during the rotating movement.

   Mount the sensor with the two screws in the respective position.

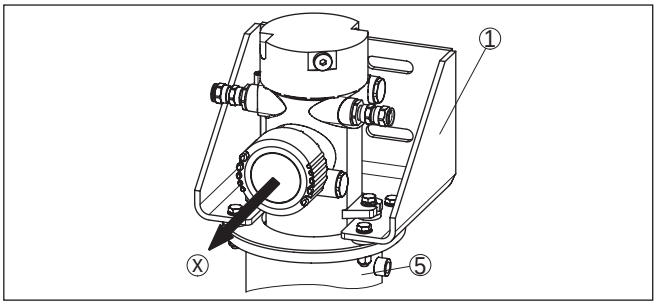

Fig. 6: Mounting direction of the sensor towards the fastening bracket

1 Fastening bracket
5 Scintillator cooling
x Mounting direction of the housing

Mount the sensor according to the following assembly drawing:

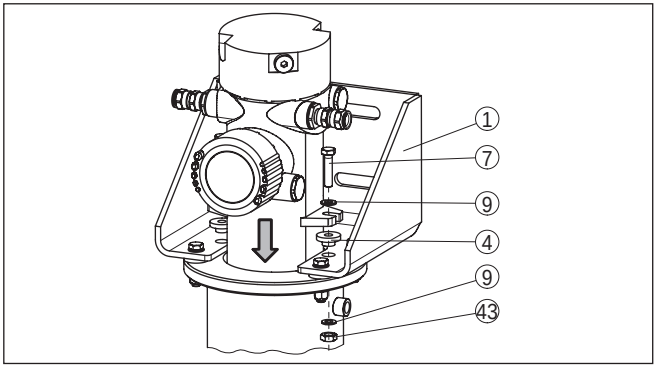

Fig. 7: Mounting the sensor - SOLITRAC, POINTRAC

1 Fastening bracket
4 Isolating sleeve (2 pieces)
7 Hexagon screw M8 x 25 (2 pieces)
9 Washer for M8 (4 pieces)
43 Nut M8, self-locking (2 pcs.)

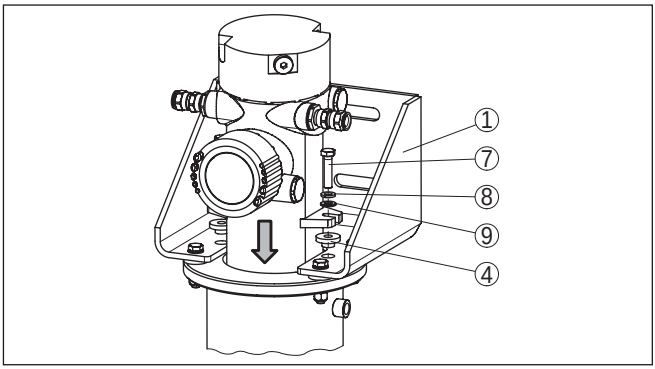

Fig. 8: Mounting the sensor - POINTRAC - short version

1 Fastening bracket
4 Isolating sleeve (2 pieces)
7 Hexagon screw M8 (2 pieces)
8 Retaining washer for M8 (2 pieces)
9 Washer for M8 (2 pieces)

Mount the scintillator cooling with the fastening bracket in the required position.

Lifting of the water cooling system

Information:
The sensor together with the water cooling system is very heavy. Use a suitable lifting device for mounting.

Use a sling with sufficient lifting capacity. Take note of the sling marking. You can find the respective weight of the water cooling system in chapter "*Technical data*".

Place the lifting sling around the cooling tube directly below the flange. The loop is a so-called lark's foot.

Fasten the hoisting sling according to the following illustration.

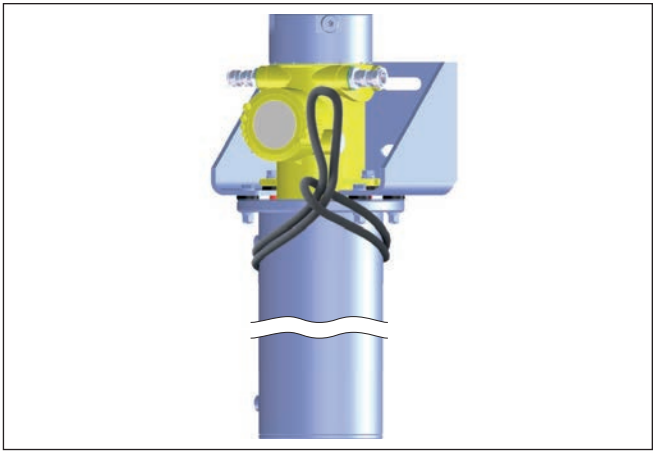

Fig. 9: Attaching the sling

Mounting the sensor

You can mount the sensor on your vessel with the enclosed mounting clamps. Two mounting clamps come with the water cooling system from 1 m (39 in) sensor length.

Adapt the distances of the attached mounting clamps.

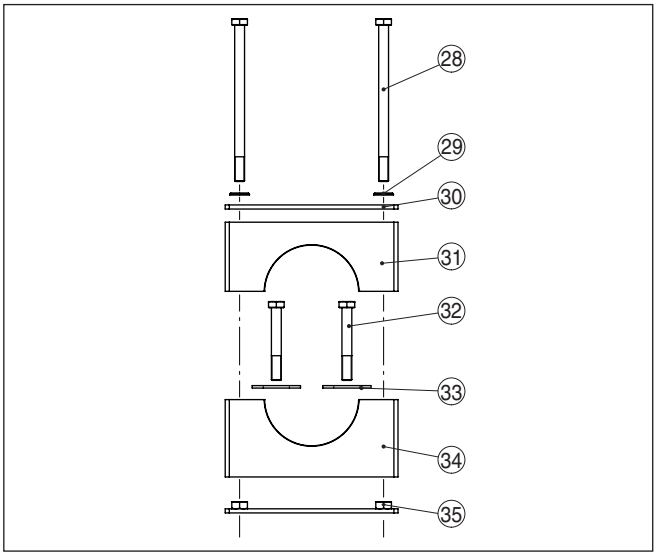

Fig. 10: Mounting clamps

28 Hexagon screw M12 x 190
29 Washer for M12
30 Cover plate - metal
31 Upper clamping jaw
32 Fastening screws (provided by the customer)
33 Metal inserts
34 Lower clamping jaw
35 Bottom plate - metal (with slot holes)

1. Determine the exact mounting position of one or several mounting clamps and mark the holes.

   You can find the drilling template in the technical data.

   Align the mounting positions exactly and average the distances between the enclosed mounting clamps.

   Drill appropriate holes (max. M12) for fastening the mounting clamps.

Note:
The mounting clamps do not come with fastening screws. Use fastening elements that are appropriate for the situation in your plant.

2. Insert the two metal inserts (33) into the gaps of the lower clamping jaw (34).
3. Place the lower clamping jaw (34) onto the bottom plate (35) and place the parts in the specified mounting position.

4. Insert the fixing screws (provided by the customer) through the metal inserts (33), the lower clamping jaw (34) and the bottom plate (35) and fasten the lower part of the mounting clamp.
5. Fasten a probable second mounting clamp exactly aligned in the same way.
6. Insert the sensor with the cooling system into the premounted mounting clamps and align the cooling system.
7. Place the cover plate (30) onto the upper clamping jaw (31) and place the two parts onto the lower clamping jaw (34).
8. Insert the two hexagon screws (28) with the washers (29) into the holes of the upper clamping jaw (31).
9. Tighten the two hexagon screws (28) with a torque of 45 Nm (33.18 lbf ft).

You can find further information on sensor mounting in the operating instructions manual of the sensor.

Electrical connection

The housing cooling lid is screwed onto the existing sensor housing like a housing lid.

1. Unscrew the housing lid (18) from the sensor.
2. Connect the sensor to power supply. Keep the instructions of the operating instructions manual of the appropriate sensor in mind.

   There is a connection diagram in the housing lid (18). This diagram is not in the housing cooling lid (19). So please note the details of the electrical connection in the operating instructions manual of the sensor.

Note:
The cooling system is used in areas with high temperatures. Therefore, use temperature-resistant cable and install it in such a way that contact with hot components is avoided.

Mounting of the housing cooling lid

1. Clean the thread of the housing cooling lid (19) and the thread on the housing.
2. Screw the housing cooling lid (19) onto the sensor instead of the housing lid (18) and turn the housing cooling lid (19) up to the stop.

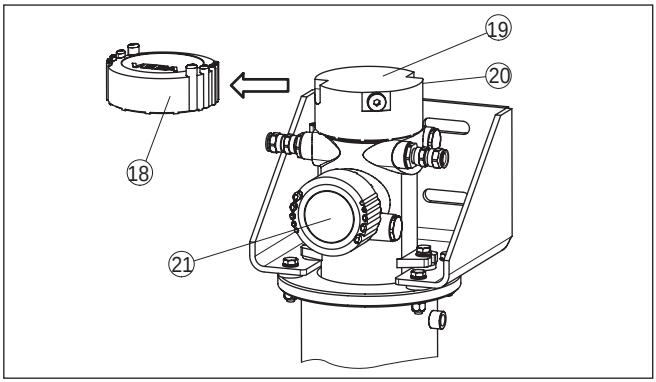

Fig. 11: Mounting of the housing cooling lid

18 Housing lid
19 Housing cooling lid
20 Connection opening for the coolant hose
21 Sensor

Connect cooling

The scintillator cooling and the housing cooling lid must be connected to the cooling circuit.

All threads for the cooling connection on the sensor are inner threads.

The required coolant hose is part of the scope of delivery.

Use clean tap water or distilled water for cooling. Oil or salt water are not suitable for the cooling system.

Make sure that the coolant cables do not freeze, e.g. in case of a shutdown.

You can find information on the throughput and the temperature of the cooling water in the technical data section.

Coolant pump

The water cooling may only be operated in an unpressurized state. Use an open cooling circuit that circulates the coolant through the system by means of a pump.

Plan the coolant pump and a possible re-cooling system according to the required inlet temperature, pumping height and water throughput.

If you want to integrate a gate valve into the system, then install it only in the feed line to avoid pressurization in the cooling system.

Caution:
Make sure that the cooling water supply is reliable und interruption-free. Plan the necessary steps for a possible pump failure, missing coolant, etc.

We recommend installing a temperature sensor (in the return flow) that triggers an alarm when a critical temperature is reached.

SIL If you want to use the water cooling in an application that is SIL qualified, you have to assess the SIL failure rates of the complete water cooling system and the cooling water supply yourself.

1. Install the coolant hose in such a way that it does not get kinked or come into contact with hot components.

Information:
Note the flow direction of the coolant. The direction of flow should be from bottom to top so that no voids can arise.

SOLITRAC 31, POINTRAC 31

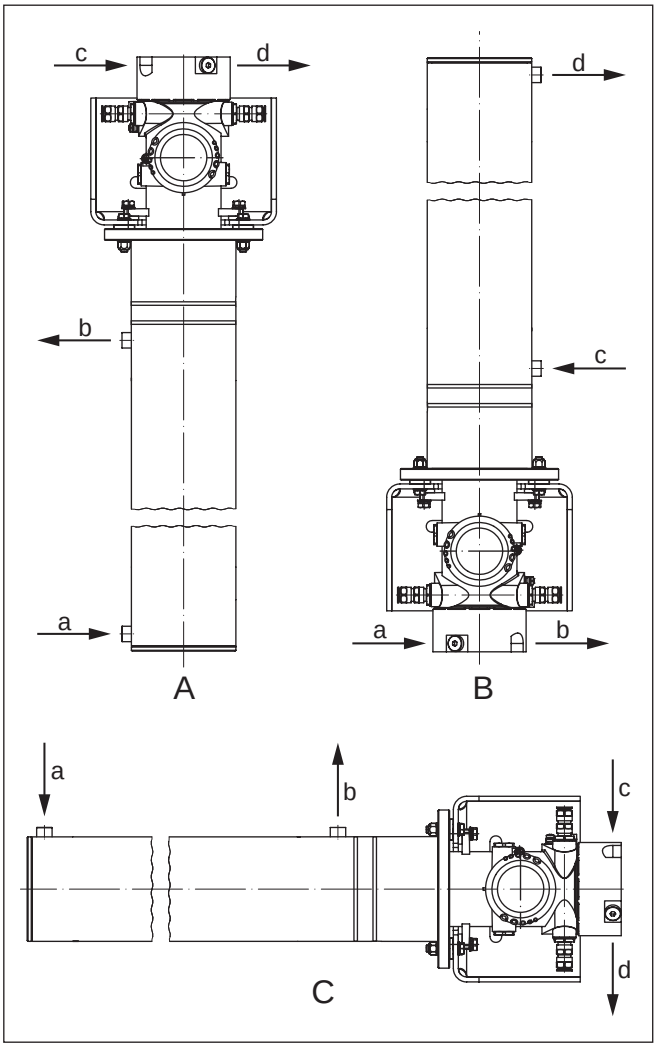

Fig. 12: Mounting position of the cooling system - note flow direction of the coolant (a, b, c …)

A Vertical mounting - housing head on top
B Vertical mounting - housing head on bottom
C Horizontal mounting

POINTRAC 31 - short version (46 mm)

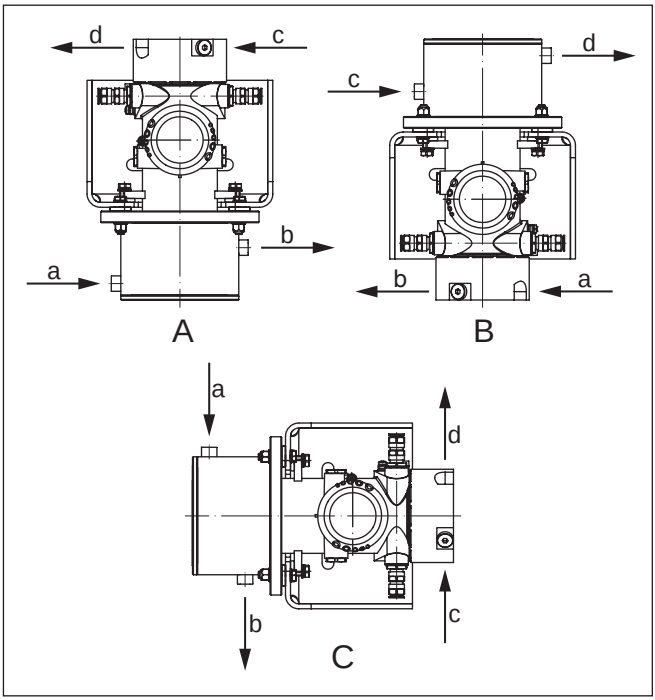

Fig. 13: Mounting position of the cooling system - note flow direction of the coolant (a, b, c …)

A Vertical mounting - housing head on top
B Vertical mounting - housing head on bottom
C Horizontal mounting

2. Connect the lines for the cooling water.

   All threads for the cooling connection on the sensor are inner threads.

SOLITRAC 31, POINTRAC 31

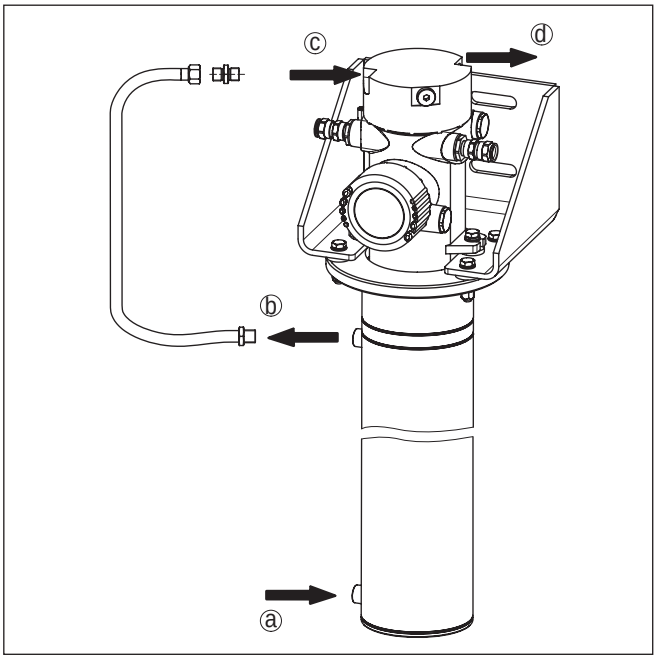

Fig. 14: Flow direction of the coolant

a Coolant inlet - scintillator cooling
b Coolant outlet - scintillator cooling
c Coolant inlet - housing cooling lid
d Coolant outlet - housing cooling lid
23 Coolant hose

POINTRAC 31 - short version (46 mm)

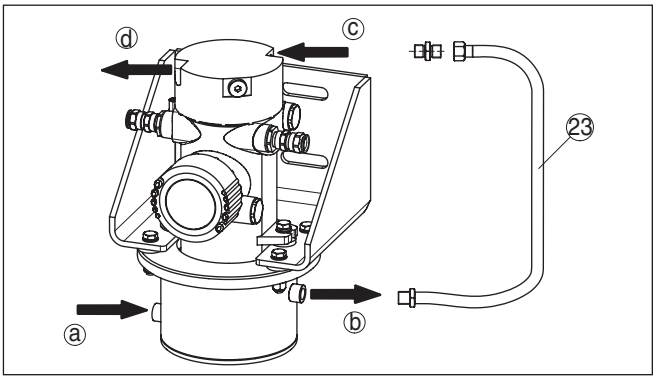

Fig. 15: Flow direction of the coolant

a Coolant inlet - housing cooling
b Coolant outlet - housing cooling
c Coolant inlet - housing cooling lid
d Coolant outlet - housing cooling lid
23 Coolant hose

Note:

The enclosed coolant hose (23) is pre-fabricated in its length. One end of the hose has a fixed connection thread, the other has a rotatable connection.

This ensures that the coolant hose remains straight.

All connection threads have seals already in place. Make sure that the seals are there when mounting.

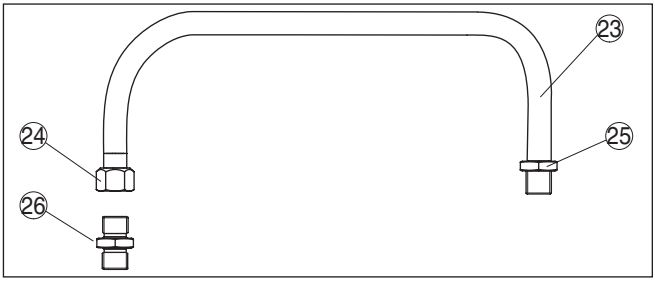

Fig. 16: Pre-assembled coolant hose

23 Coolant hose
24 Rotatable connection thread
25 Fixed connection thread
26 Double nipple ¼" (DIN ISO 228)

3. First screw in the fixed connection thread (25) of the coolant hose (23) and tighten the fitting with a torque of 25 Nm (18.43 lbf ft).
4. Unscrew the double nipple (26) from the rotatable connection thread (24) of the coolant hose and mount it in the connection hole of the sensor cooling.

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Tighten the double nipple (26) with a torque of 25 Nm (18.43 lbf ft).

5. Screw the rotatable thread (24) into the double nipple (26). Apply counterforce on the rear nut with a fork wrench (SW 19) and tighten the connection thread with a second fork wrench with a torque of 25 Nm (18.43 lbf ft).
6. Fill the water cooling system.

   Check the tightness of the system and the hose fittings.

   The cooling system may only be operated in an unpressurized state.

Caution:
Do not loosen any screws or hose connections during operation and make sure that the coolant supply is reliable and interruption-free.

Install a protective grid

Take note of the operating instructions manuals of the corresponding radiation-based sensors and the source holder.

When handling radioactive substances, unnecessary radiation exposure must be avoided.

If there are gaps or intervening spaces after mounting, provide protective fences or grids to keep hands away from the dangerous area. Such areas must be marked accordingly.

Install a safety barrier on both sides of the cooling system. A sheet metal cover or an appropriately shaped plastic sheet can also be used.

3 Replacement parts

3.1 Available spare parts - water cooling

Selected components of the cooling are available as replacement parts. The following parts are available:

The stated quantity is the quantity delivered.

Water cooling - SOLITRAC 31, POINTRAC 31

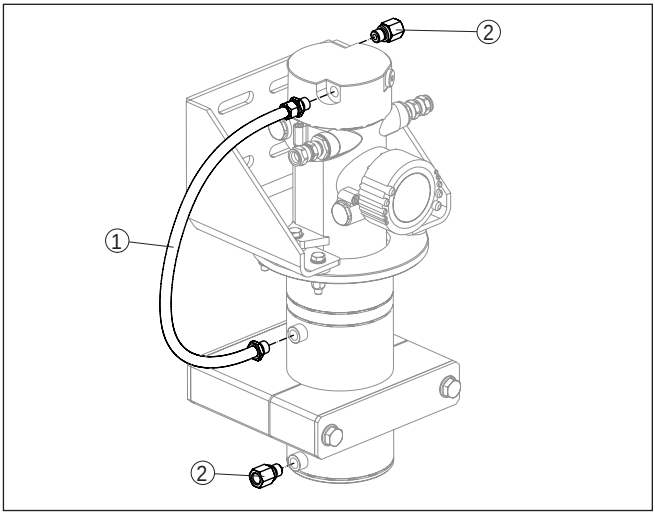

Fig. 17: Scintillator cooling - hoses and adapters

1 Coolant hose - housing cooling/housing cooling lid
2 Threaded adapter - water cooling ¼ NPT (1 pce.)

Water cooling - POINTRAC 31 - short version (46 mm)

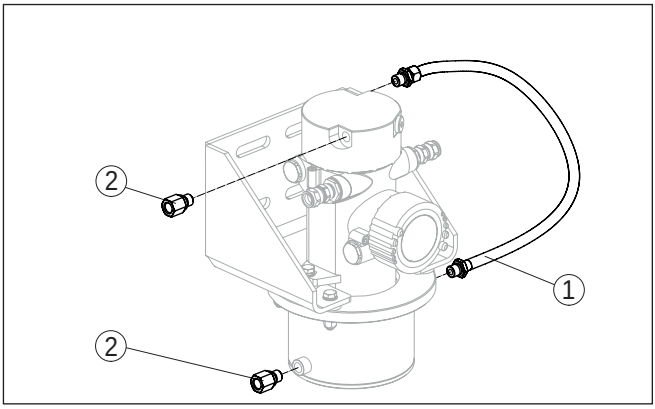

Fig. 18: Scintillator cooling - hoses and adapters

1 Coolant hose - housing cooling/housing cooling lid
2 Threaded adapter - water cooling ¼ NPT (1 pce.)

4 Supplement

4.1 Technical data

General data

Take note of the information in the operating instructions manual of the installed SOLITRAC or POINTRAC level sensor and the source holder

Material 316L corresponds to 1.4404 or 1.4435

Materials	
– Scintillator cooling	316L
– Housing cooling lid	316L
– Seal	NBR
Application temperature	See following tables (throughput - coolant)
Sensor length	3 m (9.85 ft)
Weight	
– Housing cooling (basic weight)	2.3 kg (5.1 lbs)
– Scintillator cooling	8.8 kg/m (19.4 oz/ft)
– Housing cooling lid	2.4 kg (5.3 lbs)
– Fastening bracket	4.3 kg (9.5 lbs)
– Fastening clamp	2.5 kg (5.5 lbs)
Total length of the water cooling system	3 m (118 in)
Torques	
– Screws - Sensor mounting (M8)	15 Nm (11.06 lbf ft)
– Nuts - housing cooling (M8)	15 Nm (11.06 lbf ft)
– Coolant hoses, threaded fittings	25 Nm (18.43 lbf ft)
– Screws for mounting clamps	45 Nm (33.18 lbf ft)
Connection thread of coolant hoses	¼" DIN ISO 228 outer thread (adapters for NPT fittings are enclosed with respective version)

Throughput - coolant water

Cooling water pressure	The cooling system may only be operated in an unpressurized state

Sensor length < 1 m (< 3.28 ft)

Coolant temperature	Ambient temperature		
	+70 °C (+158 °F)	+80 °C (+176 °F)	+100 °C (+212 °F)
< +20 °C (+68 °F)	0.5 l/min (0.14 US gal/min)	0.5 l/min (0.14 US gal/min)	7 l/min (1.85 US gal/min)
< +30 °C (+86 °F)	0.5 l/min (0.14 US gal/min)	0.5 l/min (0.14 US gal/min)	-

Tab. 1: Required water throughput to reach the max. permissible sensor temperature of +60 °C (+140 °F)

Sensor length > 1 m (> 3.28 ft)

Coolant temperature	Ambient temperature		
	+70 °C (+158 °F)	+80 °C (+176 °F)	+100 °C (+212 °F)
< +20 °C (+68 °F)	2 l/min (0.53 US gal/min)	2 l/min (0.53 US gal/min)	7 l/min (1.85 US gal/min)
< +30 °C (+86 °F)	2 l/min (0.53 US gal/min)	5 l/min (1.32 US gal/min)	-

Tab. 2: Required water throughput to reach the max. permissible sensor temperature of +60 °C (+140 °F)

4.2 Dimensions

Active water cooling system - SOLITRAC 31, POINTRAC 31

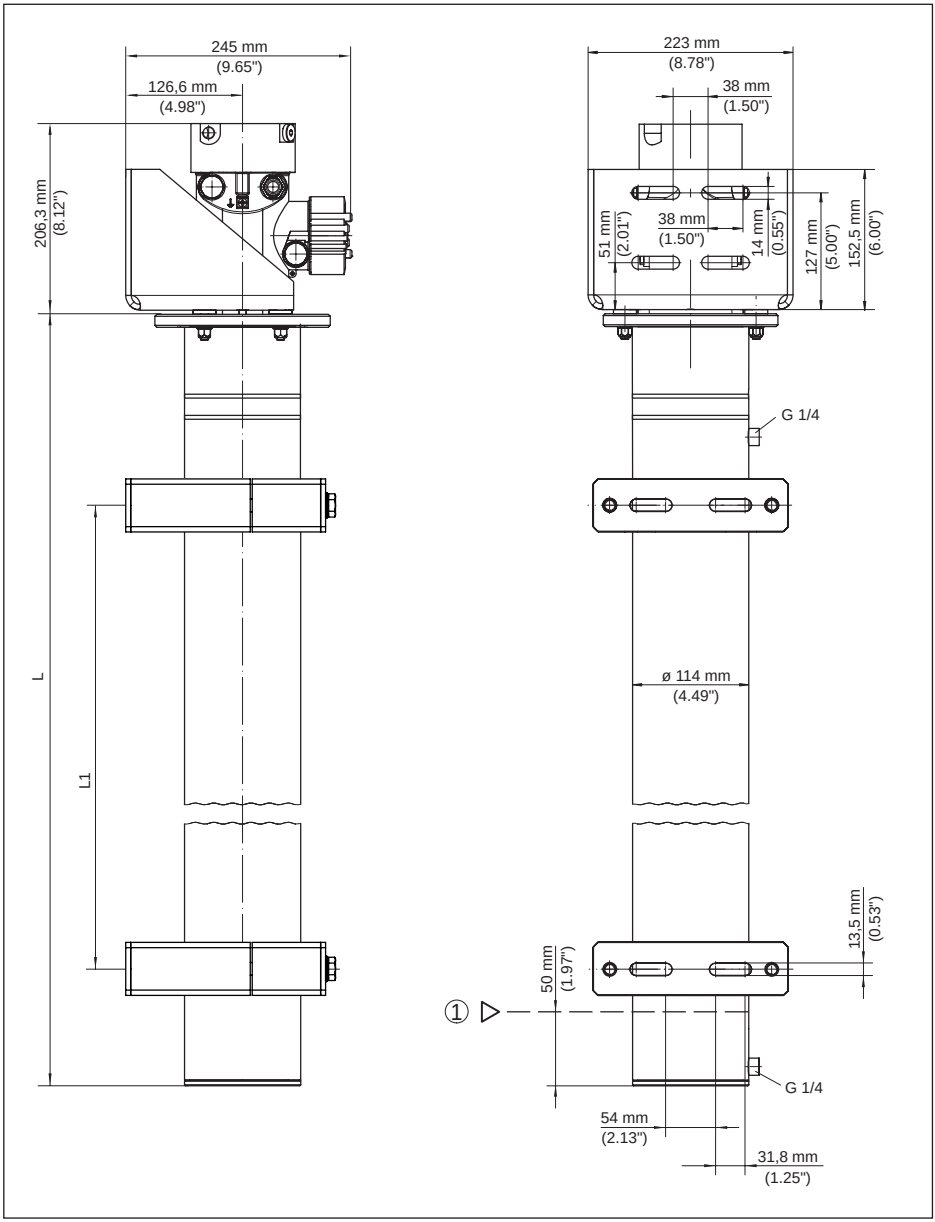

Fig. 19: Active water cooling system with scintillator cooling and housing cooling lid

1 Position of the lower measuring range end (on the upper edge of the lower screwed connection)

L Total length of the water cooling system
L1 Distance between the mounting clips = approx. 450 mm (17.72 in)

Active water cooling system - POINTRAC 31 - short version (46 mm)

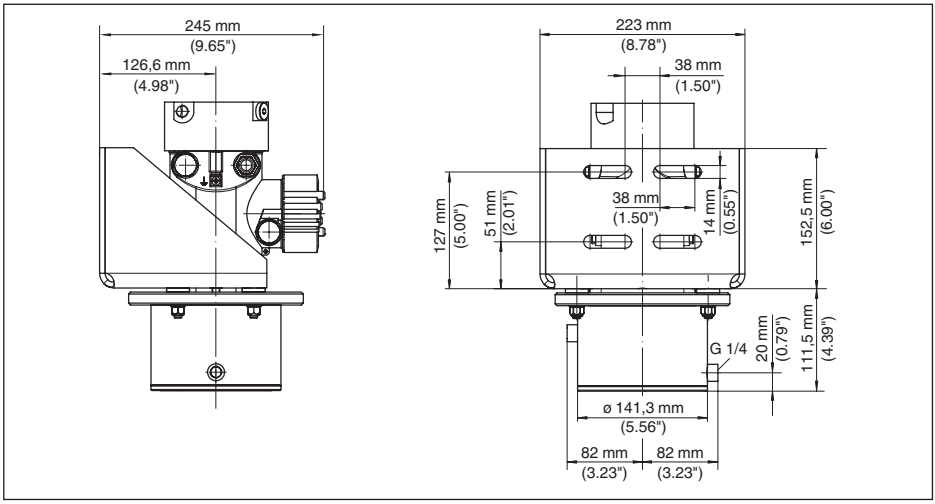

Fig. 20: Active water cooling system with housing cooling and housing cooling lid

Printing date:

All statements concerning scope of delivery, application, practical use and operating conditions of the sensors and processing systems correspond to the information available at the time of printing.
Subject to change without prior notice

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